

REMARKS

Claims 1-17, 19, 20, 26-31 are pending. In view of the following comments, Applicants respectfully request reconsideration and allowance of claims 1-17, 19, 20, and 26-31.

Claim Rejections

Claims 1-3, 5, 6, 8, 12-14, 26-29, and 31 have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Miyano et al.* (U.S. Publication No. 2003/0118270, now U.S. Patent No. 6,873,769, hereinafter "*Miyano*") in view of *Dragone et al.* (U.S. 5,926,586, hereinafter "*Dragone*") and *Hong* (WO 86/02171, hereinafter "*Hong*"). Applicants respectfully traverse the rejection.

Claims 1-3, 5, 6, 8, 12, and 13

Claim 1 recites, in part, a method for making multiple waveguide resonator devices including dividing a precursor resonator structure into multiple separate resonators. In order to establish *prima facie* obviousness, every element of the claim must be disclosed or taught in at least one reference. See MPEP § 2143.03 (citing *In re Royka*, 490 F.2d 981 (CCPA 1974)). The Examiner has admitted that *Miyano* fails to disclose dividing or cutting a precursor resonator structure into multiple separate resonators. The Examiner asserts that *Dragone* discloses mass-producing optical devices by dividing a structure into multiple separate structures.

Dragone, however, does not disclose dividing a precursor *resonator* structure into multiple resonator structures. Rather, *Dragone* merely discloses a process for fabricating non-rectangular optical devices that does not involve cutting the optical devices themselves. Multiple optical structures are formed on a single substrate. None of the optical devices are connected to one another, except by the substrate itself. See, e.g., column 2, lines 16-18, column 3, lines 57-60, and Figures 2 and 5. Cutting the substrate, therefore, does not create more optical devices, but merely physically separates existing optical devices. *Dragone*, therefore, does not disclose or suggest the creation of multiple optical devices by dividing a single optical structure as suggested by the Examiner.

In fact, *Dragone* teaches away from dividing optical structures. *Dragone* attempts to solve the problem of how to form multiple curved optical devices on one substrate without later needing to cut the optical devices themselves to separate them. See, e.g., column 3, line 62 to

column 4, line 3. Cutting through the optical devices on the substrate would render the function of the process disclosed in *Dragone* moot. In particular, the annealing process disclosed in *Dragone* uses lasers and milling machines to cut the substrate along curved paths around, and not through, the optical devices. See, e.g., column 4, lines 18-40. The process enables a user to pack multiple optical devices more efficiently on a substrate, thereby increasing manufacturing yield. See, e.g., column 4, lines 18-40. *Dragone*, therefore, does not disclose or suggest dividing a precursor resonator structure into multiple separate resonators. Rather, *Dragone* is merely directed towards a process of cutting a substrate to separate existing optical devices.

Hong also fails to disclose or suggest the feasibility of cutting a precursor resonator structure to form multiple resonator structures. Rather, *Hong* is directed towards constructing conventional arrangements similar to those depicted in Figures 1 and 2 of the present application. See, e.g., Figures 6-8 and 11 of *Hong*.

In addition, it would not have been obvious to a person having ordinary skill in the art at the time the invention was made to fabricate a resonator by dividing a precursor resonator structure into a plurality of separate resonator structures. Resonators can be difficult to fabricate because of the material and dimensional constraints required. See, e.g., page 2, lines 15-16. The smoothness of the surface of the resonator is important for creating a precise resonance. See *id.* The diameters required for setting the resonance wavelength of some resonators generally must be fabricated and maintained to a fraction of a micron. See *id.* The precise tolerances required in the manufacture of micro-ring resonators place extreme demands on the processes used to manufacture micro-ring resonators.

A person having skill in the art would have been cognizant of the requirements for precise dimensions and smooth surfaces and, therefore, would not have had a reasonable expectation of success of obtaining multiple resonators having these precise dimensions by simply dividing a single resonator. A reasonable expectation of success, as determined at the time of the invention, is required for a finding of obviousness. See, e.g., *Ex parte Erlich*, 3 USPQ 2d 1011 (Board of Patent Appeals & Interferences, 1986) and MPEP § 2143.02.

Nothing in *Miyano* suggests the feasibility of successfully obtaining many resonators from cutting or dividing a single resonator. None of the references cited by the Examiner overcome the shortcomings of *Miyano*. In fact, due to the need for precision, prior resonator manufacturing techniques include etching, thin film deposition, planar optics techniques, and

other such means for fabricating resonators. See, e.g., *Sercel*, paragraph [0107] and *Hong*, page 20, line 36 to page 21, line 8. While knowledge readily available to one of skill in the art can provide the motivation to modify a reference, none of the references cited thus far suggests the feasibility of cutting one resonator into many separate, functioning resonators.

For at least these reasons, therefore, *Miyano* would not lead a person having skill in the art to the invention of claim 1, even in view of *Dragone* and *Hong*. Claims 2-3, 5, 6, 8, 12, and 13 depend from claim 1 and are allowable for at least the same reasons. Applicants do not otherwise concede the correctness of the rejection and reserve the right to make additional arguments if necessary.

Claims 14, and 26-29

Claim 14 recites, in part, a method for fabricating multiple waveguide resonator devices. The method includes mounting a precursor resonator structure to a substrate having multiple waveguides. The method further includes cutting the precursor resonator structure and the substrate into multiple pieces. Each piece includes a portion of the substrate, a portion of the precursor resonator structure, and at least one of the waveguides.

Applicants respectfully submit that claim 14 is allowable for at least the same reasons as discussed above with respect to claim 1. Furthermore, none of the references cited by the Examiner disclose cutting the precursor resonator structure and the substrate into pieces such that each piece includes a portion of the substrate, a portion of the precursor resonator structure, and at least one of the waveguides. Therefore, for at least these reasons, *Miyano* would not lead a person having skill in the art to the invention of claim 14, even in view of *Dragone* and *Hong*.

Claims 26-29 depend from claim 14. Applicants respectfully submit that claims 26-29, therefore, are allowable over the combination of *Miyano*, *Dragone*, and *Hong*, for at least the same reasons as discussed above with respect to claim 14. Applicants do not otherwise concede the correctness of the rejection and reserve the right to make additional arguments if necessary.

Claim 31

Claim 31 recites, in part, a method for fabricating multiple waveguide resonator devices. The method includes mounting a precursor resonator structure between first and second substrates and cutting the precursor resonator structure and the first and second substrates into multiple pieces to provide multiple ring resonator devices. Each of the ring resonator devices

includes a portion of the first substrate, a portion of the second substrate, a portion of the precursor resonator structure, at least two of the waveguides, and at least two of the spacer layers.

Applicants respectfully submit that the combination of *Miyano*, *Dragone*, and *Hong* would not lead a person having skill in the art to the invention of claim 31 for at least the same reasons as discussed above with respect to claims 1 and 14. Applicants do not otherwise concede the correctness of the rejection and reserve the right to make additional arguments if necessary.

Claims 4 and 30 have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Miyano* in view of *Dragone* and *Hong* as applied to claims 1 or 14, and further in view of *Ticknor* (WO 03/036343, hereinafter "*Ticknor*"). Applicants respectfully traverse the rejection.

Claim 4 depends from claim 1 and is, therefore, allowable over *Miyano* in view of *Dragone* and *Hong* as applied to claim 1 for at least the same reasons as discussed above with respect to claim 1. Furthermore, *Ticknor* does not overcome the shortcomings of *Miyano*, *Dragone*, and *Hong*. The wire saw disclosed in *Ticknor* is used to cut a base such as a silicone substrate and not a resonator device. Nothing in *Ticknor* suggests the feasibility of cutting a precursor resonator structure to obtain multiple resonators. For at least these reasons, therefore, *Miyano* would not lead a person having skill in the art to the invention of claim 4, even in view of *Dragone*, *Hong*, and *Ticknor*. Applicants do not otherwise concede the correctness of the rejection and reserve the right to make additional arguments if necessary.

Claim 30 depends from claim 14 and is, therefore, allowable over *Miyano* in view of *Dragone* and *Hong* as applied to claim 14 for at least the same reasons as discussed above with respect to claim 14. Furthermore, *Ticknor* does not overcome the shortcomings of *Miyano*, *Dragone*, and *Hong* for at least the same reasons as discussed above with respect to claim 4. Therefore, for at least these reasons, *Miyano* would not lead a person having skill in the art to the invention of claim 30, even in view of *Dragone*, *Hong*, and *Ticknor*. Applicants do not otherwise concede the correctness of the rejection and reserve the right to make additional arguments if necessary.

Claims 9-11, 15-17, 19, and 20 have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Miyano* in view of *Dragone* and *Hong* as applied to claims 1 or 14 as

applicable above, and further in view of *Sercel et al.* (U.S. Publication No. 2002/0037132, hereinafter "*Sercel*"). Applicants respectfully traverse the rejection.

Claims 9-11 depend from claim 1 and, therefore, are allowable over *Miyano* in view of *Dragone* and *Hong* for at least the same reasons as discussed above with respect to claim 1. Furthermore, *Sercel* does not overcome the shortcomings of *Miyano*, *Dragone*, and *Hong*. *Sercel* is directed towards a method for assembling a resonant optical power control device including coupling a second optical waveguide to a resonator structure and a first waveguide. *Sercel* does not suggest the feasibility of cutting or dividing the resonator structure or the waveguide in order to create multiple resonator structures. Rather, *Sercel* discloses using conventional fabrication techniques, such as etching, to fabricate a resonator segment. *See, e.g.*, *Sercel*, paragraph [0107]. For at least these reasons, therefore, *Miyano* would not lead a person having skill in the art to the inventions of claims 9-11, even in view of *Dragone*, *Hong*, and *Sercel*. Applicants do not otherwise concede the correctness of the rejection and reserve the right to make additional arguments if necessary.

Claims 15-17, 19, and 20 depend from claim 14 and are, therefore, allowable over *Miyano* in view of *Dragone* and *Hong* for at least the same reasons as discussed above with respect to claim 14. Furthermore, *Sercel* does not overcome the shortcomings of *Miyano*, *Dragone*, and *Hong* for at least the same reasons as discussed above with respect to claims 9-11. For at least these reasons, therefore, *Miyano* would not lead a person having skill in the art to the inventions of claims 15-17, 19, and 20, even in view of *Dragone*, *Hong*, and *Sercel*. Applicants do not otherwise concede the correctness of the rejection and reserve the right to make additional arguments if necessary.

Claim 7 has been rejected under 35 U.S.C. 103(a) as being unpatentable over *Miyano* in view of *Dragone* and *Hong* as applied to claim 5 above, and further in view of *Sercel*. Applicants respectfully traverse the rejection.

Claim 7 depends, ultimately, from claim 1. Applicants respectfully submit, therefore, that claim 7 is allowable over *Miyano*, *Dragone*, and *Hong* for at least the same reasons as discussed above with respect to claim 1. Furthermore, *Sercel* does not overcome the shortcomings of *Miyano*, *Dragone*, and *Hong* for at least the same reasons as discussed above with respect to claims 9-11, 15-17, 19, and 20. Therefore, *Miyano* would not lead a person having skill in the art to the invention of claim 7, even in view of *Dragone*, *Hong*, and *Sercel*.

Applicants do not otherwise concede the correctness of the rejection and reserve the right to make additional arguments if necessary.

Conclusion

The claimed invention requires, *inter alia*, the fabrication of multiple separate resonators by dividing a single precursor resonator structure. None of the references cited by the Examiner disclose this step. Furthermore, the standard thinking in the art at the time of invention would not suggest an expectation of success using such a fabrication technique. Moreover, none of the cited references suggest the feasibility of obtaining multiple resonator devices by dividing a single resonator device.

In view of the above amendments and remarks, Applicant respectfully requests a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

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